IN THE CLAIMS:

Sub Ba 1. A method of reducing power dissipation in a communications system having a plurality of adaptive filters each having a plurality of taps, said method comprising the steps of:

specifying a threshold error for the system; and

periodically adjusting the transfer function of at least one of the adaptive filters by selectively deactivating taps while ensuring that the error of the communications system does not exceed the threshold error.

2. The method of claim 1 wherein the step of periodically adjusting the transfer function of at least one of the adaptive filters comprises the step of determining whether to deactivate a tap.

3. The method of claim 2 wherein the step of determining whether to deactivate a tap comprises the steps of:

computing the tap error produced by deactivating such tap; and

if the tap error is less than a prespecified acceptable level of tap error, deactivating the tap.

4. The method of claim 2 wherein the step of determining whether to deactivate a tap comprises the steps of:

computing the filter error produced by deactivating such tap; and

if the filter error is less than a prespecified acceptable level of filter error, deactivating the tap.

5. The method of claim 4 wherein the step of computing the filter error comprises the steps of:

determining the tap error of each individual tap; and

summing the individual tap errors.

6. The method of claim 2 wherein the step of determining whether to deactivate a tap comprises the steps of:

computing the system error produced by deactivating such tap; and

if the system error is less than the threshold error, deactivating the tap.

7. The method of claim 6 wherein the step of computing the system error comprises the steps of:

determining the filter error of each adaptive filter; and

summing the individual filter errors.

8. The method of claim 7 wherein the step of computing the filter error comprises the steps of:

determining the tap error of each individual tap; and

summing the individual tap errors.

9. The method of claim 1 wherein the step of periodically adjusting the transfer function of at least one of the adaptive filters further comprises the step of determining whether to activate a previously deactivated tap.

10. The method of claim 9 wherein the step of determining whether to activate a previously deactivated tap comprises the steps of:

periodically activating previously deactivated taps;

computing the tap error produced by deactivating such taps; and

if the tap error is less than a prespecified acceptable level of tap error, deactivating the tap.

11. The method of claim 1 wherein the filter has a sufficient number of taps to accommodate for delay due to the length of the communications line.

12. The method of claim 11 wherein a select plurality of taps positioned at the input end of the filter are not subject to deactivation.

13. The method of claim 11 further comprising the step of partitioning the taps into a plurality of blocks each having at least one tap and wherein the step of adjusting the transfer function of the adaptive filter is performed on a block-by-block basis.

14. The method of claim 13 wherein the blocks are adjusted in a sequential manner starting at the input end of the filter.

15. The method of claim 1 wherein the communications system comprises at least one echo canceller having at least one adaptive filter.

16. The method of claim 1 wherein the communications system comprises at least one NEXT canceller having at least one adaptive filter.

17. The method of claim 1 wherein the communications system comprises at least one FEXT canceller having at least one adaptive filter.

~~18.~~ A method for reducing power dissipation within a communications system having at least one adaptive filter with a plurality of taps, each tap switchable between an active and an inactive state, each tap having a coefficient, said method comprising the steps of:

a) specifying an acceptable level of error for the filter;

b) for each active tap, setting a tap threshold;

c) for each active tap, deactivating those taps having a coefficient with an absolute value less than the tap threshold set for the active tap;

d) computing a filter error;

e) comparing the computed filter error to the acceptable filter error;

f) if the computed filter error is less than the acceptable filter error, increasing, the tap threshold for each active tap; and

g) repeating steps c) through f) until the computed filter error approaches the acceptable filter error without exceeding the acceptable filter error.

19. The method of claim 18 wherein the determination of whether to deactivate a tap is done in a sequential manner starting at the input end of the filter.

20. The method of claim 18 further comprising the steps of:
periodically activating previously deactivated taps; and
repeating steps b) through g).

21. The method of claim 20 wherein the previously deactivated taps are activated in a sequential manner starting at the input end of the filter.

22. The method of claim 18 wherein each tap threshold is substantially the same.

23. The method of claim 18 wherein each tap threshold is initially set equal to the tap coefficient having the minimum absolute value.

24. The method of claim 18 wherein each tap threshold has a different value.

25. The method of claim 18 wherein the taps are partitioned into a plurality of blocks, each block having at least one tap and the tap threshold for each tap within each of the blocks is substantially the same.

26. The method of claim 18 wherein the step of computing the filter error comprises the steps of:

determining the error of each individual tap; and
summing the individual errors.

27. The method of claim 26 wherein the error of each individual tap is the mean square error for the tap and is determined by multiplying the absolute value of the tap coefficient by the average energy signal.

28. A method for reducing power dissipation within a communications system having a plurality of adaptive filters with a plurality of taps, each tap switchable between an active and an inactive state, each having a coefficient, said method comprising the steps of:

a) specifying an acceptable error for the system;

b) for each active tap, setting a tap threshold;

c) for each active tap, deactivating those taps having a coefficient with an absolute value less than the tap threshold set for the active tap;

d) computing a system error;

e) comparing the computed system error to the acceptable system error;

f) if the computed system error is less than the acceptable system error, increasing the tap threshold for each active tap; and

g) repeating steps c) through f) until the computed system error approaches the acceptable system error without exceeding the acceptable system error.

29. The method of claim 28 wherein the determination of whether to deactivate a tap is done in a sequential manner starting at the input end of the filter.

30. The method of claim 28 further comprising the steps of:
periodically activating previously deactivated taps;
repeating steps b) through g).

31. The method of claim 30 wherein the previously deactivated taps are activated in a sequential manner starting at the input end of the filter.

32. The method of claim 28 wherein the step of computing the system error comprises the steps of:

determining the error of each individual filter; and
summing the individual filter errors.

33. The method of claim 32 wherein the step of computing the filter error comprises the steps of:

determining the error of each individual tap; and
summing the individual tap errors.

34. The method of claim 33 wherein the error of each individual tap is the mean square error for the tap and is determined by multiplying the absolute value of the tap coefficient by the average energy signal.

35. The method of claim 28 further comprising the steps of :

specifying an acceptable level of error for the taps;
for each active tap, calculating the error of deactivating the tap; and
if the calculated error is less than the acceptable error, deactivating the tap.

36. The method of claim 35 wherein said steps are performed prior to steps a) through g).

~~37.~~ A method for reducing power dissipation within a communications system having at least one adaptive filter with a plurality of taps , each tap switchable between an active and an inactive state, each tap having a coefficient, said method comprising the steps of:

a) computing an initial system error

b) for each active tap, setting a tap error threshold;

c) for each active tap, deactivating those taps having a coefficient with an absolute value less than the tap error threshold set for the active tap;

d) computing a subsequent system error;

e) if the difference between the subsequent system error and the initial system error is less than a prespecified value, increasing the tap error threshold for each active tap; and

f) repeating steps c) through e) until the difference between the subsequent system error and the initial system error exceeds the prespecified value.

38. The method of claim 37 wherein the determination of whether to deactivate a tap is done in a sequential manner starting at the input end of the filter.

39. The method of claim 37 wherein each tap threshold is initially set equal to the tap coefficient having the minimum absolute value.

40. The method of claim 37 wherein the tap error threshold is the substantially the same for each tap in the filter.

41. A method for reducing power dissipation within a communications system having at least one adaptive filter with a plurality of taps , each tap switchable between an active and an inactive state, each tap having a coefficient, said method comprising the steps of:

specifying an acceptable error for each tap;

selectively deactivating those taps which, if deactivated, would produce an error less than the specified acceptable error;

specifying an acceptable error for the system;

calculating a system error;

selectively deactivating those taps which, if deactivated, would result in the calculated system error being less than the acceptable system error.

42. The method of claim 41 wherein the step of selectively deactivating those taps which, if deactivated, would produce an error less than the specified acceptable error comprises the steps of :

for each active tap, calculating the error of deactivating the tap; and

if the calculated error is less than the acceptable error, deactivating the tap.

43. The method of claim 42 wherein the step of calculating the error of deactivating the tap comprises the step of multiplying the absolute value of the tap coefficient by the average energy signal.

44. A method claim 41 wherein the step of selectively deactivating those taps which, if deactivated, would cause the calculated system error to remain below the acceptable system error comprises the steps of:

a) setting a tap threshold;

b) deactivating those taps having a coefficient with an absolute value less than the tap threshold set for the active tap;

c) computing a system error;

d) comparing the computed system error to the acceptable system error;

e) if the computed system error is less than the acceptable system error, increasing the tap threshold for each active tap; and

f) repeating steps b) through e) until the computed system error approaches the acceptable system error without exceeding the acceptable system error.

45. A communications system comprising:

a communications line;

a plurality of adaptive filters responsive to signals carried by the communications line, each adaptive filter having a plurality of taps each having a coefficient, each tap switchable between an active and an inactive state;

means for specifying a threshold error for the system;

means for setting the state of each tap;

means for calculating a present error for the system; and

means for comparing the present error to the threshold error.

46. The communications system of claim 45 wherein the means for setting the state of each tap comprises:

means for specifying a tap threshold for each tap;

means for comparing for each tap the absolute value of the tap coefficient with the tap threshold; and

means for deactivating those taps having a coefficient with an absolute value less than the tap threshold.

47. The communications system of claim 46 wherein the means for setting the state of each tap further comprises:

means for periodically activating previously deactivated taps.

48. The communications system of claim 46 further comprising means for increasing the tap threshold when the present error is less than the threshold error.

49. The communications system of claim 46 wherein a select plurality of taps positioned at the input end of the adaptive filter are not subject to deactivation.

50. The communications system of claim 45 wherein the adaptive filter has a sufficient number of taps to accommodate for signal delay due to the length of the communications line.

51. The communications system of claim 45 wherein the taps are equally spaced within the adaptive filter such that the time between successive sampling of the input signal is substantially equal.

52. The communications system of claim 45 wherein the communications system comprises at least one echo canceller having at least one adaptive filter.

53. The communications system of claim 45 wherein the communications system comprises at least one NEXT canceller having at least one adaptive filter.

54. The communications system of claim 45 wherein the communications system comprises at least one FEXT canceller having at least one adaptive filter.

~~55~~. A power dissipation reduction system for use in a communication system having at least one adaptive filter having a plurality of taps each having a coefficient, each tap switchable between an active and an inactive state, said power dissipation reduction system comprising:

means for specifying a threshold error for the system;

means for setting the state of each tap;

means for calculating a present error for the system; and

means for comparing the present error to the threshold error.

56. The communications system of claim 55 wherein the means for setting the state of each tap comprises:

means for specifying a tap threshold for each tap;

means for comparing for each tap the absolute value of the tap coefficient with the tap threshold; and

means for deactivating those taps having a coefficient with an absolute value less than the tap threshold.

57. The communications system of claim 56 wherein the means for setting the state of each tap further comprises:

means for periodically activating previously deactivated taps.

58. The communications system of claim 56 further comprising means for increasing the tap threshold when the present error is less than the threshold error.

59. The communications system of claim 56 wherein a select plurality of taps positioned at the input end of the adaptive filter are not subject to deactivation.

60. The communications system of claim 55 wherein the taps are equally spaced within the adaptive filter such that the time between successive sampling of the input signal is substantially equal.

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